C-111 Spreader Canal Project Basis of Design Report

Water Resources Advisory Commission

Jorge A. Jaramillo, P.E
Project Manager

Miami, FL
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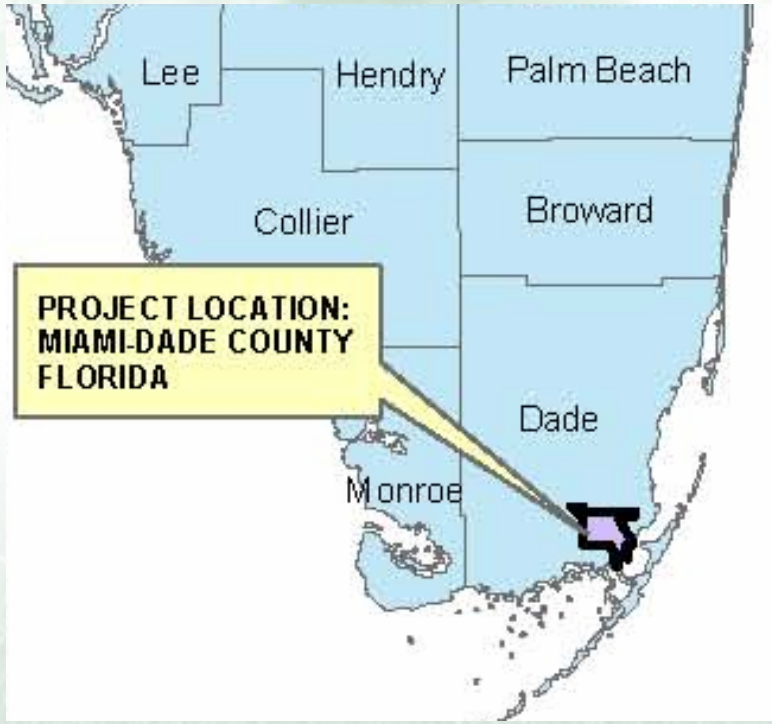
C-111 Project Background

- Located in Southern Miami Dade County
- One of initial Projects authorized for CERP under WRDA 2000 for $94M
- PMP approved by USACE and District; 3/2002
- PIR under development; due 9/2007
- Identified for design and construction under Acceler8 (Dual Track)



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C-111 Environmental Concerns

- Freshwater releases to Manatee Bay (S-197)
- Shortened hydroperiods in the marshes adjacent to the C-111 canal because of overdrainage
- Prolonged hydroperiods in marshes impounded by levees
- Disruption and redirection of natural sheet flow
- Declining fish catches and productivity in northeastern Florida Bay and Barnes Sound

C-111 Project Objectives

- Enhance connectivity between Southern Glades and Model Lands
- Provide more natural sheetflow to Florida Bay
- Restore quantity, quality, timing, and distribution of freshwater to Manatee Bay and Barnes Sound
- Maintain existing flood protection for agricultural and urban areas

C-111 Spreader Canal Phase 1 Budget and Schedule

- **Budgeted construction cost is $40M**
- **Project schedule:**
  - BODR completion: 6/2006
  - Preliminary Design completion: 1/2007
  - Final Design completion: 9/2007
  - Real Estate and Permits completion: 9/2007
  - Construction completion: 6/2010

C-111 Basis Of Design Report (BODR) Scope of Work

- **Review Existing Conditions / Background Information**
- **Survey and Geotechnical Investigations**
- **Hydraulic & Hydrologic Modeling Work**
  - Sub-regional Modeling (USACE/District)
    - MODBRANCH and MODFLOW
    - Area-wide impact analysis
  - Localized Modeling (Brown and Caldwell)
    - MODRET, CHAN, and SEEP2D
    - Near-field impacts
    - Channel hydraulics
- **Conceptual Engineering Analysis of Potential Project Components**

Existing Conditions

- Land Use/Ownership
- Topography in Project Area
- General Soil Types in Project Area
- Wetland Categories in Project Area
- Threatened/Endangered Species Habitat
- Subsurface Soil Profile
- Surface/Groundwater Elevations
- Water Availability
- Water Quality

Canal Alignments

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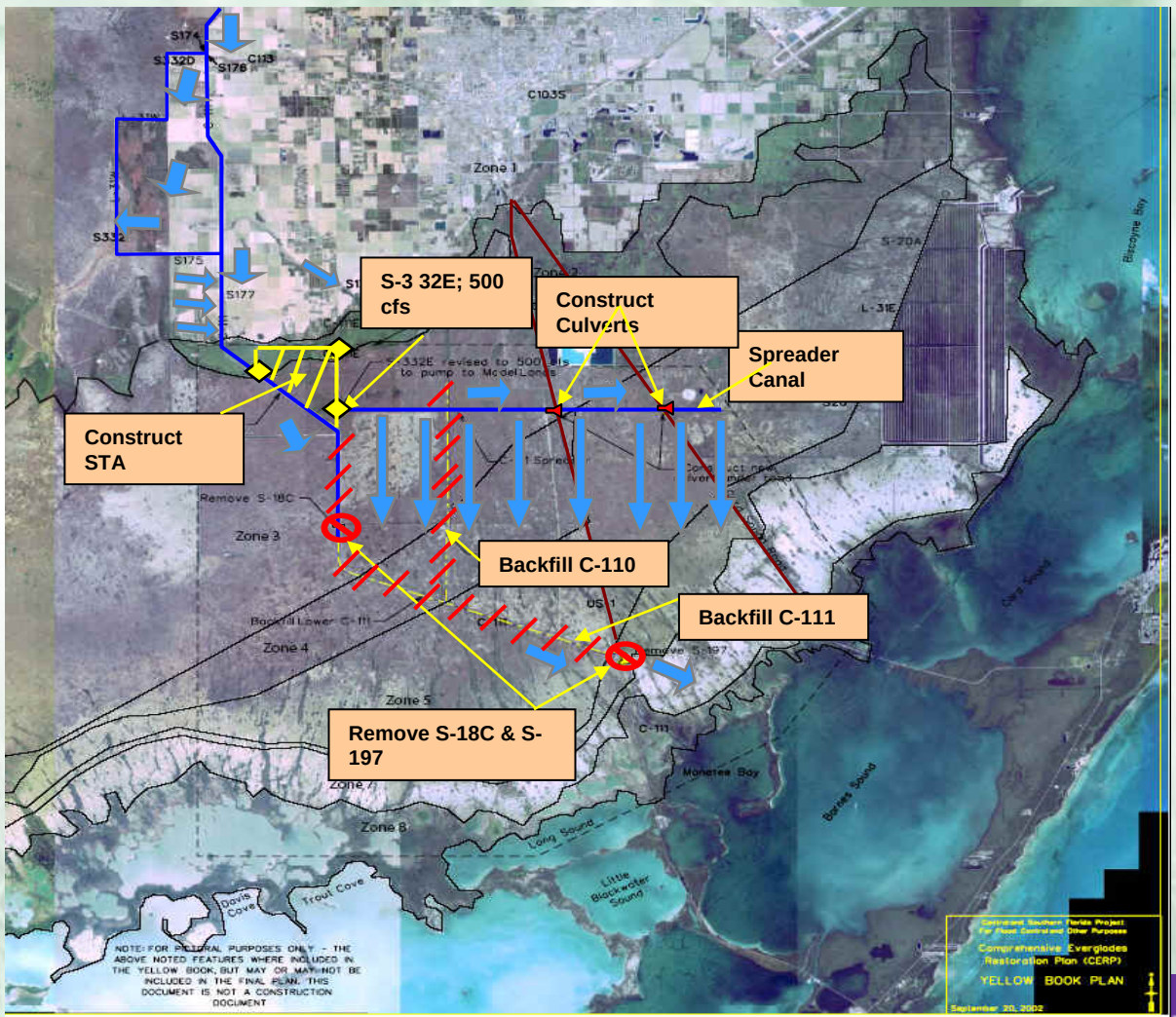
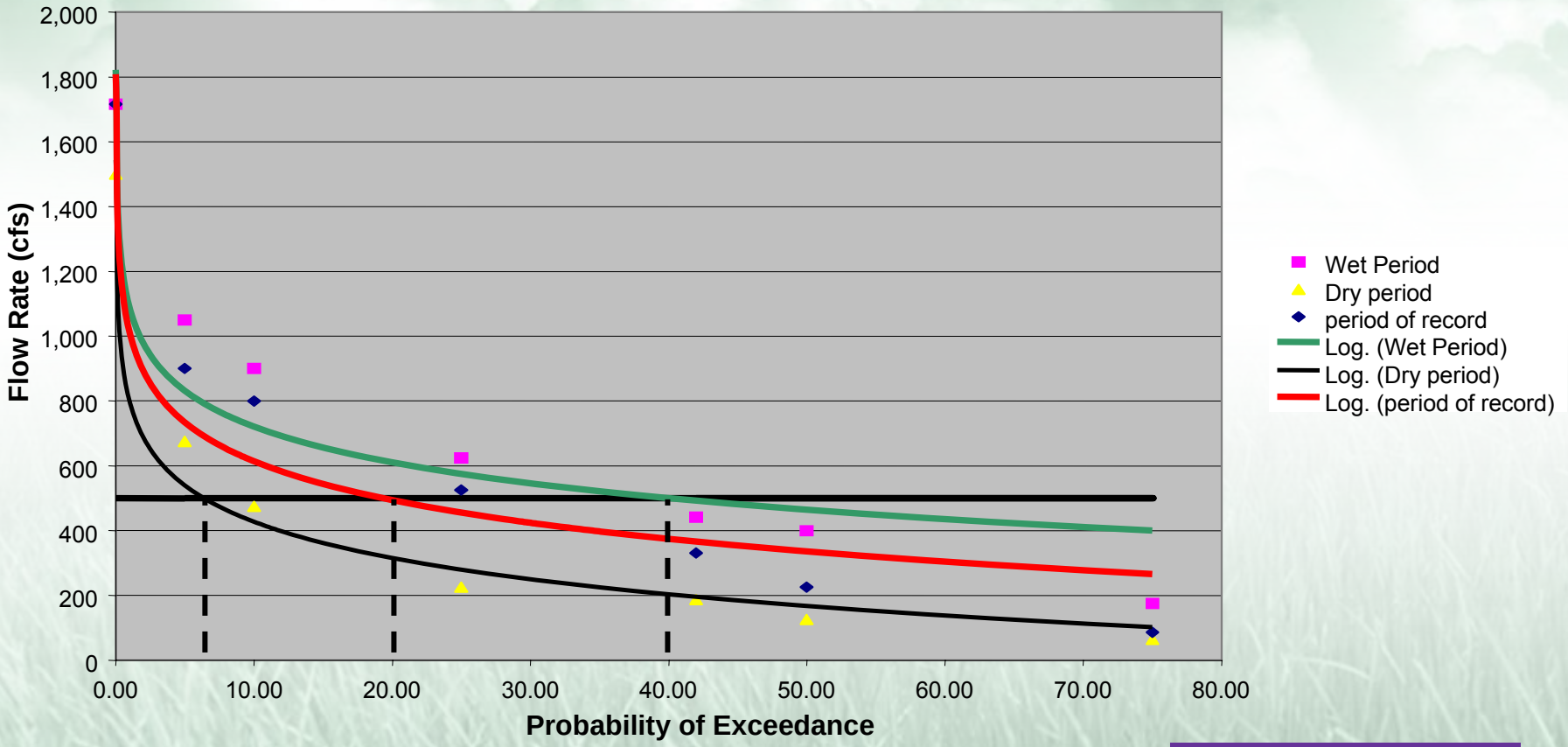
Yellow Book Plan



Probability Analysis of Flows at S-177



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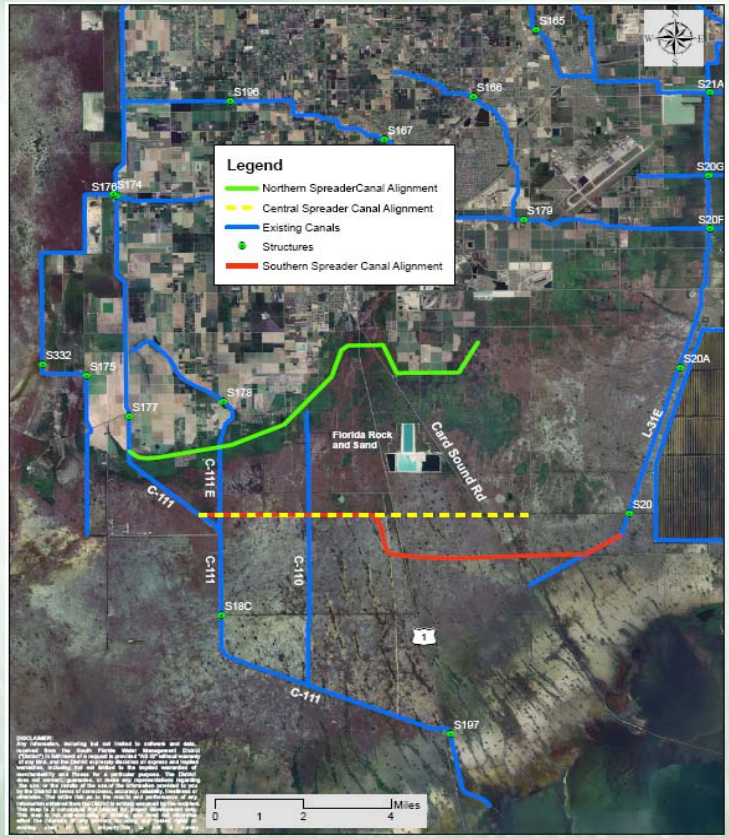
Project Components Evaluated
Pumping Station/Spreader Canal

- **Design Alternatives 1-3**
  - Conveyance/Spreader Canals (C-111 to L-31E)
  - Divert 500 cfs (PS at C-111/US 1)
- **Design Alternative 4**
  - Spreader Canal (C-111 to L-31E)
  - Divert all flows (2,900/2,000 cfs)
- **Design Alternative 5**
  - Spreader Canal (C-111 to C-108 ROW)
  - Divert 500 cfs (PS at C-111E)



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Project Components Evaluated
Ludlum Slough Water Quality Enhancements

- **Conceptual Design #1 (recommended)**
  - Establish baseflow
- **Conceptual Design #2**
  - Establish baseflow and Increase Width
- **Conceptual Design #3**
  - Stormwater Treatment Area (STA)
- **PIR Team Percolation Pond Alternative**
  - Coordination with PIR on going

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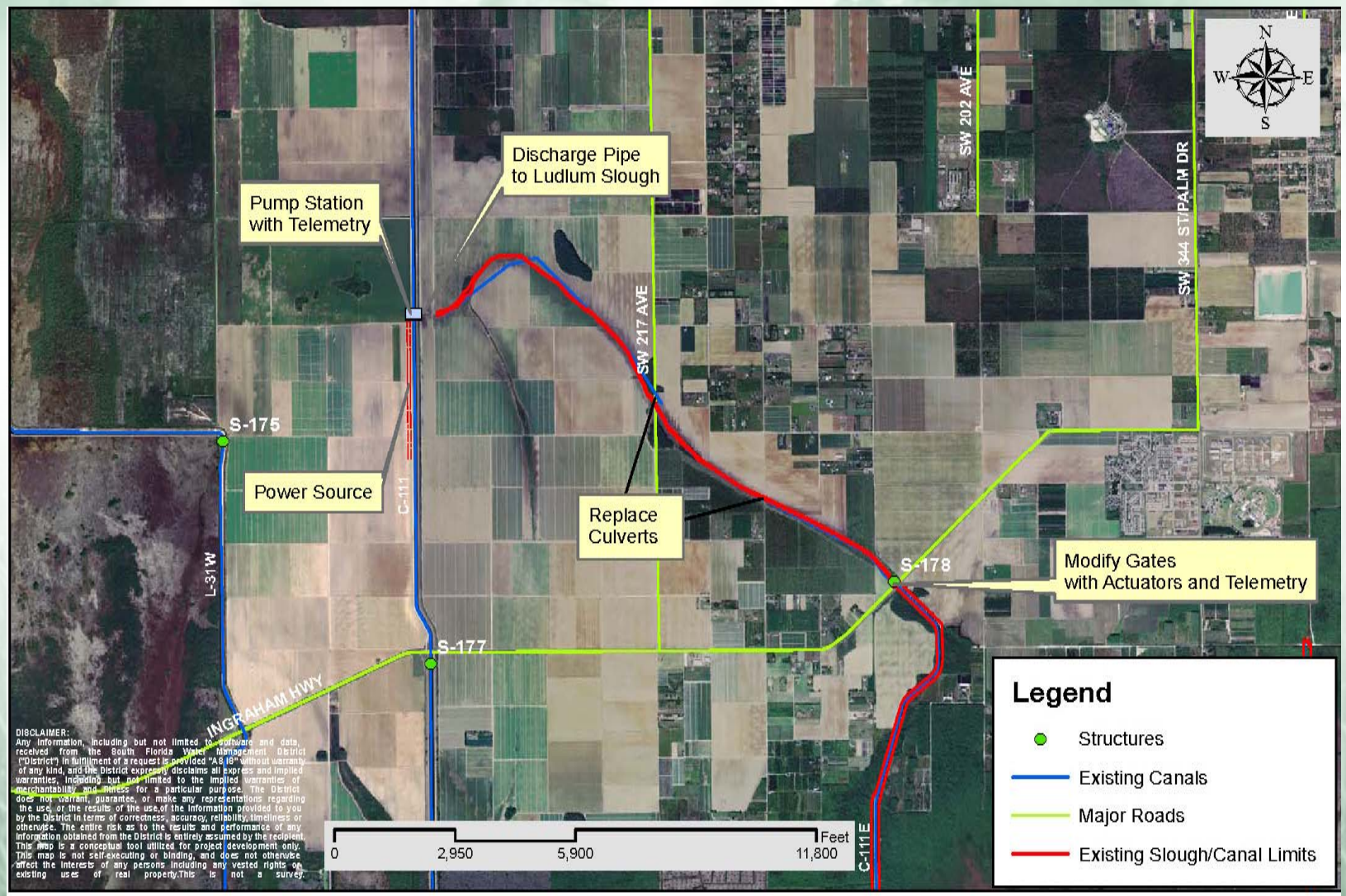
Ludlum Slough Conceptual Design #1
Establish Baseflow



Opinion of Probable Costs

Design Alternatives	Design Flow	Cost
Design Alternative 3	500 cfs	$36 million
Design Alternative 4	2,900 cfs	$95 million (*)
Design Alternative 4 VE Option	2,000 cfs	$81 million (*)
Design Alternative 5	500 cfs	$41 million

- **Real estate and mitigation costs are not included**
- **Costs include Ludlum Slough Conceptual Design #1**
- **(*) Does not include backfilling of canals and reservoir/reservoir pumping station**

Recommended Design Alternative 5

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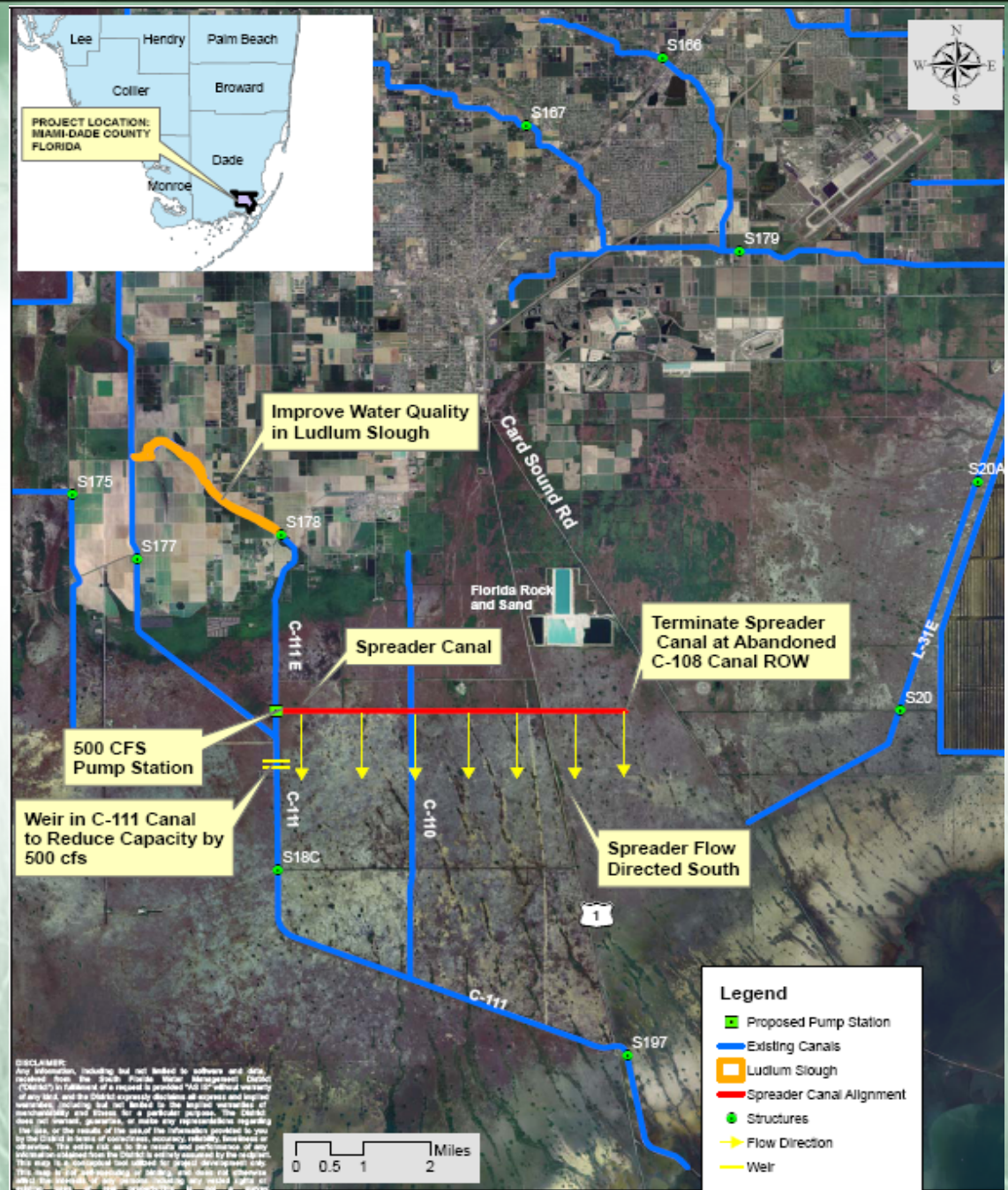

Recommended Phase 1 Project Design Alternative # 5

- Design Flow = 500 cfs
- 500 cfs pump station at C-111E Canal
- 5.4 mile canal along central alignment from C-111E to C-108 Canal right-of-way
- Channel width and depth tapers from C-111E to C-108
- Overflow weirs along spreader canal
- Submerged flow control structure in C-111 downstream of proposed Pumping Station
- Establishment of base flow in Ludlum Slough for water quality improvement

What's included in Phase 2?

Phase 1 provides flexibility to implement Phase 2:

- Includes extension of the spreader canal as identified in the Project Implementation Report (PIR)
- If necessary, includes expanding the capacity of the Pumping Station and Spreader Canal System
- If necessary, Construction of reservoir to attenuate peak flows passing through S-177
- Backfill/plug and remove berms in the C-111 Canal. Removal of S-18C and S-197. Other canals plugging, as required.
- Water Quality Improvements
- Recreational Opportunities.

Summary of Impacts Recommended Phase 1 Project

- **Beneficial rehydration of targeted sloughs and wetlands by seepage or overbank flow.**
- **Up to 500 cfs will be diverted from the C-111 Canal**
  - 80% of average annual flow volume over period of record at S-177
  - In the wet season, the average daily flow over the period of record is 442 cfs.
- **Proposed flow control weir reduces flood discharge capacity of the C-111 canal by 500 cfs**
- **Modified operation of S-18C reduces eastward flow from Taylor Slough.**
  - The result is more freshwater flow delivered to Florida Bay via Taylor Slough.

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Summary of Impacts (cont)
Recommended Phase 1 Project

- **Expected water rise during wet season ranges from 0.1 to 1.4 ft within 500 ft of spreader canal**
- **Properties potentially impacted by maximum expected rise:**
  - Juvenile Detention Center: 0.4 ft
  - Private properties within ¼ mile: 0.3 ft
- **No Negative Impacts on US 1**
- **Anticipated water quality improvement in Ludlum Slough**

Opinion of Probable Costs Recommended Phase 1 Project

Project Component	Estimated Construction Cost
Spreader Canal	$30.7 million
Pump Station	$8.2 million
Ludlum Slough CD #1	$2.1 million
Project Total	$41 million

Stakeholders Input

- Improve Water Quality in the Ludlum Slough
- Reduce flow from Taylor Slough into C-111 Canal to improve deliveries to Florida Bay
- Plug Aero Jet, C-110 and L-31W canals and evaluate deliveries of water via Taylor Slough to Florida Bay
- Concerns about design of flow control weir in the C-111 canal
- Concerns about the timing between Phase 1 and Phase 2.

Summary and Recommendations

- **Budget authorized for construction $40 Million.**
- **Design Alternative 5 is recommended for the Phase 1 Project with an estimated cost of $41 Million.**
  - It incorporates Ludlum Slough Conceptual Design #1, and
  - Provides flexibility for future implementation of Phase 2
- **Recreational opportunities will be explored during future design phases**
- **Details of Phase 1 Project features will be coordinated with PDT during Preliminary Design**

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List of Acronyms

- **BODR** Basis of Design Report
- **CERP** Comprehensive Everglades Restoration Plan
- **CFS** Cubic Feet Per Second
- **District** South Florida Water Management District
- **PMP** Project Management Plan
- **PIR** Project Implementation Report
- **STA** Stormwater Treatment Area
- **USACE** US Army Corps of Engineers
- **WRDA** Water Resources Development Act
- **PDT** Project Delivery Team

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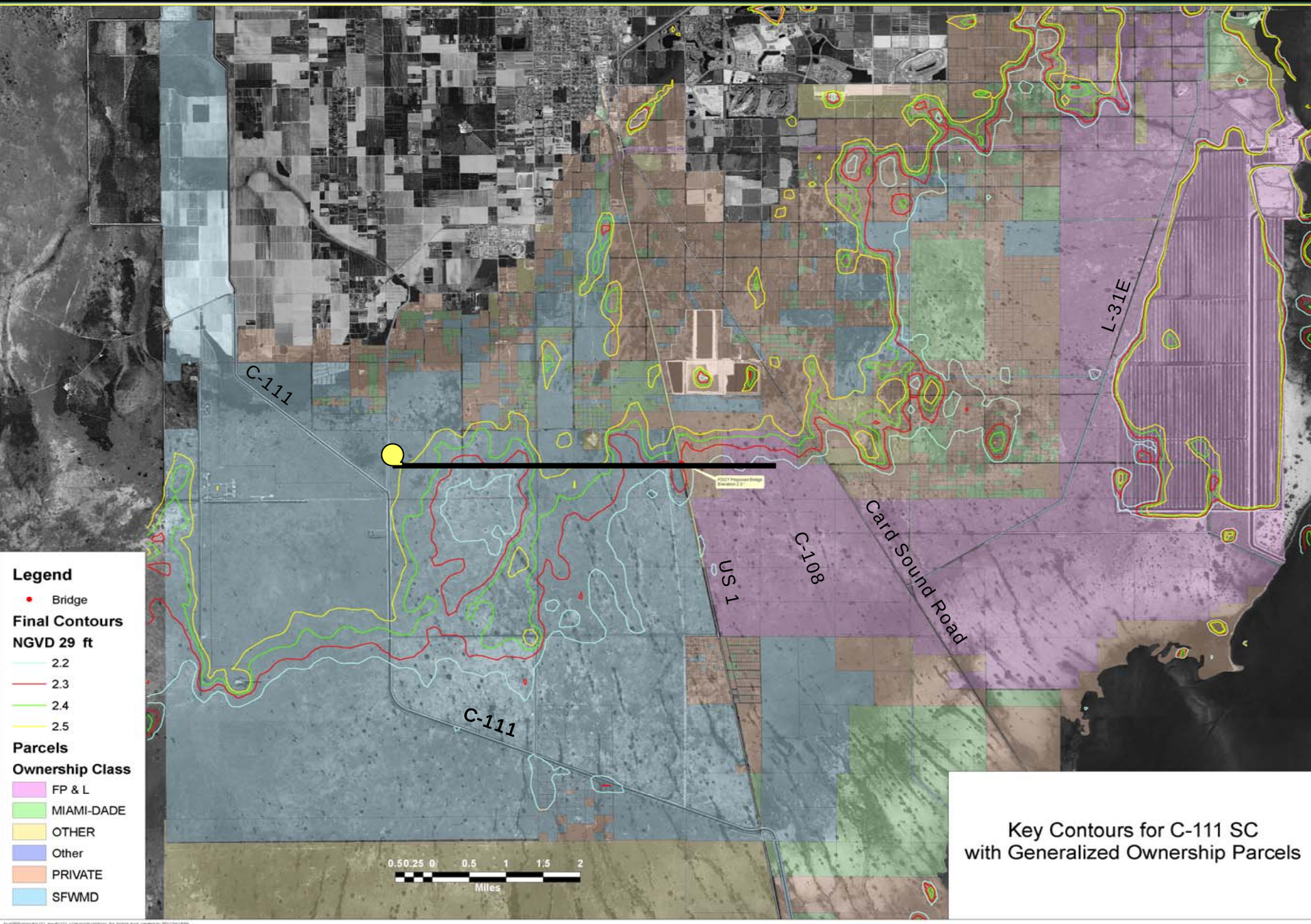

Key Contours for C-111 SC
with Generalized Ownership Parcels

Land Ownership in the Vicinity of the Spreader Canal